American Electro-platers' Society

(An Educational Society)

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MONTHLY REVIEW

DECEMBER, 1914

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I shall pass through this world but once. Any good thing, therefore, that I can do, or any kindness that I can show to any human being, let me do it now. Let me neither defer nor neglect it, for I shall not pass this way again.—*Amiel.*

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MONTLHY REVIEW

American Electro-platers' Society

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Vol. 1 DECEMBER, 1914 No. 7

Editorials

THE PLATER AND HIS ENVIRONMENTS

Upon being requested to write the Editorial for this issue of our valuable Review, I began to seek a suitable subject, and in view of the literary giants who have preceded me with their able accomplishments, this seemed a difficult task. But in the uplifting of the standard of our art and placing ourselves upon a proper plane, the resources seem limitless, if what is to be said will be read with an open mind, and accepted as intended.

The Plater

There is perhaps no other profession in which the variety of elements have been more divided. The intent here is to harmonize and build upwards, and also show a realization of some things which may not as yet be fully accepted or appreciated.

It has been my good fortune to observe and study the plater from both a practical and commercial viewpoint; experience shows him to have been a more or less dependent creature with but few exceptions. Heretofore when he lost his position he ran helter skelter for the Supply House for another one. When in a position and in trouble, he again threw out the signal of distress to the Supply House. In fact, this has seemed his only available source of aid for years.

His Emancipation

When Mr. Charles H. Proctor and a few others met at New York City nearly six years ago, and founded the N. E. P. A., they obviated the main reason for their dependencies and obligations, and this fact has become more and more in evidence with the progress and growth of the Society. Here the plater has an available source or veritable fountain of information at his command. Here also has been provided his means of securing employment, and both these features are quite independent and apart from all previous sources and should be used and encouraged by the membership.

His Employer

This very necessary element in the development and progress of the plater has been more or less the position of his employee; if he needed a plater he went to the Supply House. If he was in trouble, to the Supply House again, in search of

new or special finishes to the Supply House again, and the result has been that in a great number of cases, both employer and employee have been more or less obligated and there seemed to be no avenue of escape until the advent of the Society.

Under the present situation, with the plater communing with his fellows at the Society meetings, with the National Bureau of Information always open to him, and with the Society always in a position to furnish able men to employers, both can be free and independent, and hold all Supply Houses on an equality and demand the consideration of all, consequently compelling merit alone to bring its rewards.

The Supply House

This element in the development of the plater has, at times, been abused. It has played a part for which, in a great many instances, it is entitled to a great deal of credit. Many times though it has come to grief through some of its recommendations of platers who seemed to be blessed with an enlarged "thirst," and also due to recommendations of formula and processes due to lack of knowledge on the part of the plater. It should and does, I believe, welcome the increasing knowledge of the plater, since this will, in a large measure, relieve it of a part foreign to its real mission of supplying the best equipment for the required result.

It has been asked to be a veritable encyclopedia of information, and has been used as an employment bureau and in many ways has accomplished a great deal of good. It should, and I believe does, welcome the new conditions with acclaim, as all of the features which the Society cultivates, tend to make these tasks easier in the future. The education of the plater will fit him to understand many things which have heretofore seemed mysteries to him and of which he has always been more or less skeptical and hence the selling of honest goods will become an easier problem.

The personal contact of the plater with the men of his art will tend to broaden character and business acumen, which will be quickly recognized by employers and purchasing agents, and he will be called into consultation in many transactions with the salesmen where heretofore he has been ignored.

The Future

If the changed situation, as well as the possibilities of the Society, could be brought home forcibly to all eligible platers, I am sure they would all come into our ranks at once. Likewise, if these things could be impressed forcibly upon all employers of platers, I believe they would insist upon their platers joining the Society at once; hence let us all be sponsors for the Society by preaching its doctrine of education and good will towards all and malice towards none. Let us also guard jealously its prestige, so that no class of our membership abuse these precepts. We should admonish all members to severely criticise privately or openly in meetings, if necessary, anyone who would

use his membership, of whatever class, in the Society for the purpose of promoting anything individually or collectively for personal gain or ulterior motive.

We should so conduct ourselves in our various occupations as to be stimulating examples of influence to others to come into the fold, and in this way build up and place the Society upon that high pedestal of influence and front rank of education and accomplishment in the arts where it belongs.

E. LAMOUREUX.

CHICAGO'S BANQUET

The third annual banquet and open meeting of Chicago Branch was held Saturday, December 12th, at the Grand Pacific Hotel, nearly one hundred and fifty members and employers being present. It was a grand success in every way and thoroughly enjoyed by all present. The menu was good and the music inspiring. The papers read were interesting and the members and their friends were happy.

President Servis acted as toastmaster and as such earned credit for himself and Chicago Branch. Supreme President Joseph H. Hansjosten, arriving after the guests were seated, was given a reception that shook the building. It was a reception that should gladden the heart of anyone, and was indicative of the high regard in which the Colonel is held by Chicago Branch, of which he is a member. Vice President John P. Manz read a letter from Past Supreme President George B. Hogaboom, and the applause that followed proved the great esteem in which our past president is held by our members. Mr. E. Lamoureux read a letter accompanying a paper by Mr. Harry de Joannis, Editor of the "Brass World," both being applauded and heartily enjoyed. These letters appear in this issue, as they are too good to be kept from the membership. Letters were also read from Supreme Secretary Mr. Walter Fraine and Mr. Earl Eckenrode.

President Servis in his address spoke eloquently of the progress Chicago Branch had made since its organization. Mr. S. E. Huenerfauth delivered a paper on "The Voltmeter and Ammeter." Dr. Oliver P. Watts of the University of Wisconsin was again with us and read a masterly paper, entitled "Some Observations on Nickel Plating Solutions." Mr. Walter Donnelly's paper dealt with "The Pitting of Nickel Deposits," which showed a study of this perplexity. Louis Schulte gave a number of "Hints of Value to the Plater." H. E. Willmore spoke on "Finger Tips." Colonel Hansjosten's address was full of praise for the officers of the Society. Mr. Harry de Joannis' paper told how it was "From the Beginning." All present will carry with them through life another event that will add to their store of pleasant memories because of the American Electro-platers' Society.

Letter from Past Supreme President George B. Hogaboom:

Members of the Chicago Branch,
Chicago, Ill.

Gentlemen:—

Through our esteemed friend Mr. Willmore, I wish to extend to you my most sincere wish for a banquet that will surpass all that were before and one that will set a high mark for those that are to come.

We realize that you will have to "go some" to do that, but from my most enjoyable experience in Chicago I know that the Chicago Branch has the "go" and it will take "some" to outdistance the cordial hospitality of its members.

Six months have passed since we had the pleasure of breaking bread with you, six months that were often illuminated with bright flashes of pleasant recollections. The hearty shake of the hand, the smile that could not conceal the heart behind it, and, most of all, the man behind the hand, who, as a co-worker, closed the circuit of friendship that charged the heart with an accumulation of loyalty and fellowship.

To have known and to have been associated with you will always be to me a source of happy recollections. I can see before me now the Colonel, the man whom his Maker was compelled to give a large physique to carry a heart "the largest in the world." Servis, with his intimate grasp of detail, always on the alert to be of some service. Lamoureux, the worker, ready and eagerly willing to share more than his own burden. Schulte, "made in Germany," as powerful and as needful in the plating industry as Cy-a No-gen is in the plating room. Liscomb, with the smile that even trouble in the plating room could not eradicate. Hall, Bott, Schmidt, Huenerfauth, Ohlmacher—what is the use of trying to name the whole Chicago Branch—all contributed to make the first real convention a success, a success that meant so much to me, that gave the glories of a sunset to my regime.

There is one more, not that I forgot, but because I know he has a place in the hearts of all, Willmore. What more need be said; his name alone spells success, but his achievements emblazon the letters.

What more can be said. My sorrow is that I cannot be with you; my pleasure is that I know you and pray for your success.

GEORGE B. HOGABOOM.

Letter from Harry de Joannis, Editor "Brass World":

Mr. H. E. Willmore,
Chicago, Ill.

Dear Willmore:

In desperation I have dictated the accompanying tragedy. If on reading it you find that it is unsuitable to the peace of mind of the Chicago banqueters, cast it forth into outer darkness and tell me about it and I will supply the necessary ac-

companiment of weeping and gnashing of teeth. If, however, it finds favor in your eyes, choose someone to deliver it who possesses a vox humana and tremolo stop in his vocal chords, so that the proper emphasis may be distributed either at the right or wrong moment, no matter what moment as long as it is distributed.

Anticipating the pleasure of seeing you in the near future and hearing tales of a feast of soul that will make my mental and physical palates water, I remain,

Yours sincerely,

HARRY DE JOANNIS.

ADDRESS BY O. E. SERVIS, PRESIDENT CHICAGO BRANCH

Gentlemen and Fellow Members of the Chicago Branch: It is with sincere pleasure I welcome you to this, our third annual banquet. The past year has been one of history to our Branch blessed with growth and success, and we have gathered here again to enjoy some of the fruits of our labors. To see such a splendid attendance is very gratifying to every member, and it is my firm belief that when you leave here tonight you will for several reasons feel amply repaid for having participated with us on this occasion.

You cannot grasp the hand of good fellowship extended to you without feeling some emotion. The excellent program which the committee has arranged cannot fail to make this an enjoyable evening in every respect. Furthermore, I am satisfied that the papers which are read here tonight will make a convincing impression upon your mind and be of some benefit.

We hope you will be impressed with the importance of these meetings and the distinction of being a member of a Society whose prime object is progress along educational lines, intermingled with a social and fraternal spirit to help one another along the theoretic and practical lines of Electro Deposition of metals, and which, next to our family, centers close to our hearts, stimulating our activity to greater deeds in our chosen calling.

The American Electro-platers' Society, although as yet only in its infancy, consists now of fourteen branches in the principal industrial centers of the United States and Canada. The Chicago Branch has proven itself a worthy asset to the Society. It was organized in May, 1912, with a membership of twenty-two, and we now have over one hundred in good standing, and are the largest branch in the Society.

That its members have been and are untiring in their efforts for the welfare of the Society is largely apparent by the percentage of papers or articles that have been read before the Branch and published in the Review. This may be accredited to the enthusiasm and friendly harmony which has always prevailed within its ranks, and I dare say, within the entire Amer-

ican Electro-platers' Society, a spirit which was so well displayed at the Chicago Convention last June.

The Chemsitry of Electro-Deposition of Metals is of the utmost importance both to the manufacturer and the plater; but of this, unfortunately, few of the latter have sufficient knowledge, and it is along the chemical lines that the Society is endeavoring to concentrate its efforts.

Usually what the plater lacks is not how much the article is to be plated or finished, but rather a knowledge of why he fails; and that brings us to the chemical side of the art, which is entirely distinct from the mechanical or executive phases.

The object of these annual events is to bring the employer and the plater in closer relationship with each other, and to convince the manufacturer that we are fair minded men and our cause is worthy of his support and co-operation, and that it is to his interest to have his plater foreman a member of this Society. Unfortunately, the importance of the plater's position is often misunderstood and underestimated. A great deal is expected of him when you consider the many qualifications demanded of a man in charge of a plant. He must not only devote much of his leisure time in study and experiment in order to obtain sufficient knowledge in Electricity, Chemistry and Mechanics in general, but must also possess executive ability to manage his department at the lowest cost possible, at times, unreasonable. Many employes are not well enough informed in regard to electro plating and believe that, because a helper "can hang in and take out" a batch of work, the latter is a plater; he is sometimes engaged, and generally found to be a costly experiment. If the same employer was aware of the actual waste of time and material in producing inferior results, very detrimental to his business, or his product, he would willingly engage a competent plater.

We wish to acquaint you, Mr. Employer, with the fact that we have your interest at heart as well as our own. If your foreman is a member of this Society, here is the place where he can take his problems and through discussions with his fellow-platers get assistance from competent men, who are willing to do this without any thought of compensation whatsoever.

Already many of the manufacturers have begun to inquire of the plater, when seeking a position, if he is a member of the American Electro-plater's Society, and in several instances when the negative answer was returned, the employer wanted to know "why not?" This we take as a good indication that many of them appreciate the work of the Society—in fact, quite a number of employers have volunteered to pay the dues of their foreman and in other ways showed their appreciation. I could mention several large out-of-town concerns who insist their plater foreman attend the meetings, and they defray their expenses.

Many members have found it necessary in order to become proficient in chemistry, to devote much time and thought to these

subjects and often more time than they can spare. We have already received instructions in chemistry from a competent chemist who, although an able instructor, could not handle the subject in a manner that would apply to practical Electro plating, and therefore, for the present, this has been discontinued. Although such instruction can only be of a preliminary nature, I wish to emphasize the fact that to continue to be a successful plater he must devote some time to the study of Electro-chemical phenomena, if he would keep abreast of the plater who is to come.

We expect, ultimately, when the Branch has grown sufficiently, to establish a permanent laboratory where chemical tests of solutions and supplies can be made for the benefit of its members. One of the many things we are endeavoring to accomplish is to create a standard for all solutions, which, without doubt, will improve and better systematize our work, though it is possible that a standard formula will not prove successful in all cases, because the nature of the article to be plated, as well as conditions, play an important part. But it will serve the purpose at least in one way—it will eliminate the many confusing formulae by various authors to obtain certain results in plating or finishing certain metals, of which many are of no particular value and are simply a perplexity to the plater. A committee on standardization—as suggested by our Editor—composed of such well known authorities on Electro-chemistry as Professor Bancroft, Burgess, Childs, Watts and Miller, would prove of immense value to the Society.

In closing, I would like to say to you, Mr. Employer, that this Society is not, and never can be, analogous or in any way related to labor unions or organizations. The question of compensation can never be raised on the floor of this Society. That is a matter—at least as far as the Socity is concerned—to be settled between the principals. You are invited to attend any of our meetings, as we have no secrets, and do not conduct our business behind locked doors—so encourage membership in the American Electro-platers' Society.

To you, Mr. Plater, who are not a member, but eligible, I would earnestly urge you to obtain an application from the Secretary tonight and "get busy."

I also wish to thank those who have so ably assisted us with our program, and let us hope that the seed that has been sown by the American Electro-platers' Society will bear fruit to posterity.

ADDRESS BY SUPREME PRESIDENT, JOS. H. HANSJOSTEN

Mr. Toastmaster and Gentlemen:

It seems but a short time since Chicago Branch gave its first banquet, and yet two years have swiftly passed since that momentous and happy occasion. As we look back over those

two years and review the events that have made history for our Branch, we feel a thrill of pride, even of exultation, at the wonderful progress that not only our Branch, but the entire American Electro-platers' Society, made during that time. Every month, every week, even every day, has been one of progress and advancement. Every promise that the organization of the Branch meant has been fulfilled; every dream of the members has become a reality. Work that has been and will continue to be of inestimable value to the plater, was begun during those two years, and much of it has been brought to successful completion. And much work that is now under way will, under the guidance of your faithful and efficient officers, pile proof upon proof that Chicago Branch is in the very forefront of the great movement that means so much to the plater, educating him in his profession, and thereby placing him where he should be, among the most efficient men in the industrial world.

To carry on the work of education, which is the principal object of our Society, it is not only necessary that we should all contribute our mite and be ever enthusiastic in the cause, but it is also necessary that our officers should be guided by a sincere desire to render service, rather than by personal ambition. And I cannot refrain from saying a few words to you about the men you have chosen for officers of our Branch. Much of the work of the Branch is left for them to do, and still more of it is done under their direction and guidance, and I congratulate you on the choice you have made. You have displayed rare wisdom and splendid judgment in your election, for the work they did in the offices they held previous to their elevation to those they now grace, entitles them to the higher honors, and they are honoring us by the able manner in which they are discharging their duties.

President Servis made a record as Secretary-Treasurer that any man may be proud of, and that record will be more than equalled by the record he is making as President. The quiet, earnest work by Mr. Manz on the Board of Managers, previous to his elevation to the Vice-Presidency, may well make us rest easy as to the future, for when he and many more like him, who are quietly laboring in the ranks, give to the Society so much earnest endeavor, the future of our Branch is secure.

Every month there comes to us a silent but eloquent visitor that tells us in language that puts mere words to shame that the dynamic energy and giant intellect of Mr. Willmore are out at work. Our "Monthly Review," of which he, as Editor, is making so signal a success, will ever be a monument to him for a duty faithfully performed. Of equal value is his work as Secretary-Treasurer of our Branch. So faithful is he to both trusts, that we cannot say we appreciate his work in either office more than in the other. When future historians of our Society will record the events of today, the brightest pages in all that history will be those that give to our posterity the story of the work done for our Society by H. E. Willmore.

And while I am speaking of the unselfish devotion that not only our officers, but every member of our Society feels for it, I would fail in doing my full duty if I did not say how much I appreciate the work of every one of our Supreme officers, and particularly that great man of Dayton Branch, who with Mr. Willmore, does the lion's share of the work necessary to conduct the business of the Supreme Society, our efficient Supreme Secretary, Mr. Walter Fraine.

I am glad to have this opportunity to publicly thank them all for their work and to express my appreciation of it. And will you again let me thank you for the honors you have given me, and let me assure you that I am trying hard to show you that I appreciate them by doing the work you have assigned to me as well as I know how.

And let me also assure you, Gentlemen, that your officers fully appreciate the fact that they could do nothing without your earnest co-operation and hearty support, and I know they have both in fullest measure, I know that your officers consider themselves your servants, and they consider the offices they hold as a trust placed in them by you, and all of them are endeavoring to so discharge the duties of their offices that you may never feel that your trust has been misplaced.

As our Branch has made wonderful progress, our Sister Branches have done likewise. They, and the Supreme Society, have kept step with us in the steady march toward our goal, the education of the plater, to place him on a higher standard of efficiency. That the road we must travel is not all smooth and level, we full well know, but by persistent effort we shall remove all obstacles and overcome all difficulties. As eternal vigilance is the price of liberty, so is perseverence the cost of accomplishment. Every difficulty encountered and overcome will only prepare us to cope more successfully with greater ones that may follow, but no matter what may come, with an abiding faith in the principles of our Society, knowing the cause of our Society to be a part of the motive power that makes for the uplift of humanity, let us cheerfully and steadily labor to spread its gospel of education until every man who is eligible to membership shall be within its enlightening fold.

The enthusiasm begotten by association has developed another feature that has grown far beyond the fondest dreams of the founders of the Society. I speak of the spirit of fraternity that permeates every gathering of the members. Fraternity and Friendship go hand in hand with Education,, and Fraternity and Friendship have become precepts of our Society. And we cannot practice them too much. By aiding each other all we can, by seeing only our fellowman's good qualities and overlooking his weaknesses, by saying a kind word to him and for him, by remembering always that to have a friend we must be a friend, we will not only be practicing the precepts that our Society teaches, but we will be contributing our mite toward

making the world a better place in which to live and adding to the sum of human happiness.

And so let us smilingly face the future. Let us believe that the future will be what we make it, with our minds set on success, refusing to even think of failure, our road plainly before us, ourselves steadily on our way, we cannot miss our goal.

With our Society old enough to make us appreciate the want it fills, there is no one in all its ranks willing to go back to the days when it was not. No one in all its ranks is willing to trade the bright sulinght of association with his fellows for the dark gloom of isolation of former days. And still let us not be content, but let us be ever striving for something better, for our faith in our Society must not be one of contentment, but rather one of activity. Not of something attained, but of something attainable. And though we see more clearly every day and year its accomplishments and its benefits, we must ever strive to make them greater. Let us not be content to live in the glory of its Yesterday, but let us rather, with cheerful hearts, look forward to the dawn of its Tomorrow.

SOME OBSERVATIONS ON NICKEL PLATING SOLUTIONS *

By Oliver P. Watts

I deem it a privilege to be once more numbered among the guests of the A. E. S. at its annual banquet. I have a very pleasant recollection of your hospitality during the past two years, and of your fair-minded attitude toward the results of some of my experimentation in the field of electroplating. This branch of Electro-chemistry has engrossed my interest more and more, and its problems furnish a most fascinating line of research. During the past few weeks I have been conducting a series of experiments upon certain phases of the deposition of nickel, and I have considered the results of sufficint interest to bring them to you tonight.

The first topic to which I would call your attention is the composition of the anode. For many years it has been the practice of the makers of anodes in the United States to add to the nickel varying amounts of iron, carbon and tin, so that the resulting anode contained only about 92 per cent of nickel. The following formula for making nickel anodes is taken from one of the plating trade journals: "Nickel 92 per cent, tin 4 per cent. old files 4 per cent. (Metal Ind., 1907, p. 116.) Why old files are preferred to any other form of iron is not stated. A more recent article says: "The anodes are cast in varying degrees of purity, the average commercial anode consisting of about 92 per cent nickel and 8 per cent tin, while other grades, consisting of 85 to 89 per cent nickel and 11 to 15 per cent iron and tin, are especially adapted to certain work. A few are made of pure

* Read at Chicago Branch banquet, December 12, 1914.

nickel free from alloy, but are too hard for ordinary purposes." (Foundry, 1913, p. 17.)

The purpose of these impurities has been explained as follows: "Commercial nickel anodes contain, in addition to nickel, iron, tin, and carbon. These are introduced intentionally to render the anode 'soft,' i. e., so that it will dissolve easily in the solution during plating." (Brass World, 1911, p. 154). Analysis of samples of commercial nickel plate (J. Amer. Chem. Soc., 1917, 29, p. 1268) has shown the presence of 0.08 to 0.09 per cent of iron, and one writer (Trans. Amer. Electrochem. Soc. 9, 217) has ascribed the rusting of nickel plated articles to the presence of this iron. Whether this is true or not, these impurities in the anode are of no benefit either to the solution or to the nickel plate, and their presence in nickel solutions should no longer be tolerated. For a number of years European platers have been using anodes containing 98 per cent of nickel, and it is time that American platers followed their good example. In a solution containing only sulphates these pure anodes do not corrode well, but the addition of one or two ounces per gallon of a soluble chloride remedies this trouble. Nickel, sodium, or ammonium chloride should be added to a solution in which pure anodes are used.

The little 25-gallon plating tank at the University was formerly equipped with the standard American anode, containing iron, carbon, and a trace of copper. A heavy brownish sediment of ferric hydrate continually collected in the bottom of the tank, and when standing unused, copper was precipitated on the anodes and a scum of iron rust formed on the surface of the solution. Becoming dissatisfied with this state of affairs, I precipitated the iron, added some sal ammoniac to cause good anode corrosion, and replaced the impure anodes by sheets of electrolytic nickel. (Obtained from the Orford Copper Co.) Electrolytic nickel anodes have now been used for seven years, and have proved satisfactory. At that time it was, I think, impossible to secure cast anodes of high purity in this country, but today the plater who wishes to avoid introducing impurities into his solution from his anodes is not confined to the use of electrolytic anodes, as cast anodes of high purity are now obtainable.

Another improvement in nickel plating which has come to us from Europe is the high-power nickel solution. It may be profitable to consider for a moment what constitutes a high-power nickel solution. It is not some mysterious chemical of wonderful potency, but is merely a solution containing much more nickel than the old style bath, and which, therefore, permits of using a greater number of amperes per square foot of plated surface without causing a burnt deposit. Since the rate of deposition increases directly as the number of amperes, the time of deposition is lessened proportionately.

There seems to be a prejudice on the part of many platers against strong nickel solutions, as indicated by such statements as the following, taken from periodicals which regularly devote

considerable space to plating: "A new bath composed of double sulphates and water not infrequently gives trouble from peeling in addition to the dark color, especially if the solution stands in excess of 6 degrees Baume. To remedy, reduce the density to 4½ or 5 degrees and add the conducting salts." (Foundry, 1913, p. 106.)

"Question. Our nickel deposits come out dark gray and rough after 1½ hours deposit. The solution stands at 10 degrees, and we have added single salts.

Answer. Your solution is too concentrated. In America, solutions that register 5½ to 6 Baume give the best results, provided the metal content of the solution is correct. Concentrated solutions produce dark deposits that readily stain, and often cause peeling." (Metal Ind., 1911, p. 353.)

Yet today many platers are paying 35 cents a pound for an imported mixture of unknown salts, making solutions having a density of 16 degrees, and obtaining extremely satisfactory results from these dense solutions.

I have here a good nickel deposit, made at 18 amperes per square foot, from a solution of nickel and magnesium chlorides having a density of 31.3 degrees. In thickness it is equivalent to a deposit for 20 hours at 3 amperes per square foot. If high density of solution were capable of ruining a deposit, this would be the worst sample of nickel plating which you have ever seen. It is time that platers recognized that poor nickel deposits are due to some other cause than too dense a solution.

I have tested but one of the high-power salts now on the market, but for a period of two months this has done all that the dealer claimed for it. I cannot conceive that a plater who has once tried this salt would ever use the old double sulphate solution, if he could obtain the price of this high-power salt. It must be admitted that the expense is great, 100 gallons of solution costing $70, instead of about $7 for the double sulphate solution. Even if we grant that one tank of high-power solution will do the work of four tanks of the double sulphate, the ratio of costs is still over two to one against the high-power solution. Only when the composition of these salts becomes known, or platers discover equally good combinations of salts themselves, will the high-power solution compare favorably with the old style solution as regards cost per unit output. When, however, freedom from peeling and burning, and when, in many cases, a more satisfactory anode-corrosion is secured, even at present prices, the greater capital outlay required for the high-power solution may be fully justified. There is, too, the possibility of using the new salts in half the concentration specified, thus cutting the investment in half, and running the solutions at 5 amperes the square foot instead of ten.

There are several methods of making a dilute solution do the work of a concentrated one. One method is to circulate or stir the solution, or to move the object; any process that will break up the film of dilute solution formed around the object,

and supply metal as fast as it is needed for deposition. Circulation and stirring of the solution have long been used successfully in the electrolytic refining of metals, but because of stirring up the sediment always present in plating tanks, or possibly for some other reason, these methods have not come into regular use in commercial plating. Where heavy deposits are necessary, as in silver plating, some means of shortening the time is desirable, and motion of the cathode rod has frequently been resorted to, thus allowing an increase of current density and a corresponding lessening of the time. This method is applicable in any case where a heavy deposit of metal is necessary, and its use has already been extended to the deposition of nickel.

But there is another and more effective way of transforming an ordinary dilute nickel plating bath into a high-power solution. That is to heat it. For the past three weeks I have been experimenting with hot nickel solutions. From a solution containing 10 ounces per gallon of the double sulphate, at a temperature of 194° F. and a current density of 29 amperes per square foot, a good deposit was obtained in twenty minutes, which would have required 3½ hours in the cold solution at the usual current density of 3 amperes per square foot. Similarly, the current density in a high-power bath of full strength at 165° F. was increased at intervals to a maximum of 206 amperes per square foot, without spoiling the deposit; this is the equivalent of 19 hours at 3 amperes per square foot. To establish a record for the rapid plating of nickel a brass tube ¾ inches in diameter was used as cathode, and rotated at 1,000 R. P. M. Many trials were made at increasing current densities, and although a current density of 1,257 amperes per square foot was reached in one trial, the deposit was still excellent. Two minutes at this current density gives a deposit equivalent to 14 hours plating at 3 amperes per square foot, and in spite of this heavy deposit, 2 to 3 minutes with tripoli and rogue was sufficient to give it the polish of the sample shown. How much higher the current density can be carried under the conditions of these three experiments I am at present unable to say, and it really does not matter to the electro plater, as it has been shown that in a hot nickel solution the current density can be carried to such a point that the ordinary plating bath becomes a high-power solution. The efficiency of deposition on a rotating cathode at 625 amperes per square foot was found to be 99.8 per cent. But there is another result obtained in the hot solution which I regard as of more value to the nickel plating industry than rapidity of deposition; that is the softness, toughness and freedom from peeling of the deposit.

In the case of thick nickel deposits from cold solutions, their hardness makes buffing both difficult and expensive, they are more liable to peel than thin deposits, and the time required for their production is excessive unless a high-power solution is used. In view of these facts, it is not surprising that in the

past many platers have used altogether too light deposits. Much of this thin plating affords no protection to the underlying metal and is not even ornamental, for after a few months' use it wears off in spots and the articles look worse than if they had never been plated. Too much nickel plate is made to sell instead of to wear.

What could so much increase the popularity and extend the use of nickel plate as to have every bit of it which ever gets into the hands of the public put on to stay, and thick enough to protect iron from rusting and to last for years?

I believe that this can be accomplished by the hot nickel solution. Its use will enable the plater to produce a thick deposit in less time than is now required for a thin deposit. By heating the regular plating solution to 180° F., or above, deposition can be carried on at twice or three times the rate of the present high-power solutions. By using a hot high-power solution, current densities of 100 to 200 amperes per square foot may be used on stationary cathodes, or, since such great current densities as these are not needed in plating, the high-power solution may be diluted to three times its original volume and yet be used at 20 amperes per square foot. The deposit from a hot solution is soft, never peels from a clean surface, and is quickly and easily polished even though it appears dull as it comes from the bath. This ease of polishing should result in a considerable saving in the time and labor required for buffing, and would partly defray the cost of heating the solutions. The heating coils should be made of lead.

It has long been known that hot nickel solutions give soft deposits and the following extracts would seem to indicate that hot nickel solutions have been tried and found wanting:

"Question No. 1283. What is the advantage of running a nickel solution hot and what are the disadvantages?

Answer. The advantage gained in using a hot nickel plating solution is that the nickel deposits faster and is brighter. In addition, the nickel is apt to be slightly softer and more free from pits. Beyond these advantages, a hot nickel solution has no other benefits. The disadvantages are the fact that the solution must be heated, and requires far more care and must be maintained at a constant temperature in order to obtain uniform results. Cold plating solutions are always used wherever possible, and in the case of nickel solutions it is generally considered that the slight advantage gained by using them hot does not warrant the extra labor involved. It is possible to obtain sufficiently good results in cold solutions of nickel." (Brass World, 1913, p. 145.)

"Question No. 1324. What will happen if a nickel solution is run hot?

Answer. Nickel solutions can be run hot and give good results and soft deposits. They should, however, be used much weaker than when employed cold. It is generally found unnecessary to use them hot, as the trouble of heating and maintaining

them is more than the gain in quality. Hot solutions deposit nickel very rapidly." (Brass World, 1913, p. 258.)

In general these statements agree with my experiments, that a hot solution yields a soft nickel deposit, and permits of more rapid deposition, but on the question of whether heating will pay or not we have come to opposite conclusions. This is a matter which cannot be settled by argument, but only by trial on a small commercial scale. Cannot some local branch of the A. E. S. take up this question and carry it to a definite conclusion? Its potential importance merits an early and decisive trial by practical men.

It will probably be found that careful temperature regulation is not essential to success when the plating tank is equipped with an ammeter so that the plater knows what current he is using, although it may prove otherwise if he has to depend entirely upon the voltmeter in controlling the current. This leads me, in closing, to speak of the necessity of an ammeter, or ammeters, of suitable range so connected that the current passing in each tank may be read. It is the number of amperes per square foot of surface receiving the metal which determines whether the deposit will be good or bad, and not the volts across the tank. The voltage itself has no influence on the character of the deposit, and may have any value that is necessary to send the proper number of amperes to the objects which are being plated. The voltmeter is better than nothing, since, with its aid, the plater can make a better guess at the proper adjustment of the rheostat than he could without it, but it is a poor substitute for the ammeter. The plater needs both voltmeter and ammeter for proper regulation of current and solutions. If a record is kept of the volts and amperes it will not only tell what current to use on a particular tank when partly, and when completely, filled with work, but it will indicate changes in resistance of the solution. To calculate the resistance of a plating tank, read the volts and amperes, open the switch or otherwise break the circuit for a second, just long enough to get a reading of the voltmeter. Subtract the second voltmeter reading from the first, and divide by the current; the quotient is the resistance in ohms. Since the resistance diminishes greatly with increase of temperature, a change in the resistance of a solution does not surely mean a change in composition unless the temperature is the same as when the resistance was measured before. It is not necessary that there should be as many ammeters as there are plating tanks, for a single instrument may be arranged to read the current in any one of several tanks. At the outset it might be well to purchase only one ammeter, and use it until convinced that it is a great help in plating before putting in a full equipment.

FROM THE BEGINNING*

By Harry de Joannis

Electroplaters should be profoundly interested in sex problems, for without them the electroplating industry would never have come into being.

As soon as Adam had secured a wife, at the cost of one bone, she told him she had nothing to wear. Fair ladies since then have said the same, but Eve holds the record of being the only one to tell the absolute truth when she said it.

He's and she's succeeded each other, and the she's repeated the same formula, "I have nothing to wear." At first the men paid little heed to the women's complaints, believing that this was merely a part of feminine grumblings and was not of vital importance for their consideration. When, however, the fair ones took to wearing copper anodes suspended from their lips, ears and noses and adorned themselves with aprons composed of gaudily colored rocks, men whispered to each other that the race was deteriorating, for the women did not move so swiftly as they used to and could not longer carry as many burdens as their foremothers did. The brightest minds of the times studied the problem and decided that ornaments of lighter weight should be produced and from that day men hammered metals in order that great surface with minimum weight should be obtained. Hammering the women had proved useless. From that time jewelry began, and each year since man has taxed his ingenuity to the utmost to embellish the universal "she."

At first, of course, these fanciful objects were formed from the solid metals, and the only possible givers of such costly presents were the high and mighty ones who claimed the titles of lords over those who dug and retrieved the precious metals.

The women of lower degree, however, coaxed their mates continually for similar adornment to that possessed by the more favored ones. Men desperately sought for sleep, peace and happiness under this bombardment of female opportunity, which lasted for several thousand years.

In the nineteenth century, the discovery of electroplating opened the way of escape from man's previous troubles, and now the cheapest base metals may be coated with the most precious ones so as to deceive even the very elect. A peasant's child can obtain in a ten-cent store a bauble that would have tempted the virtue of St. Anthony or aroused the envy of Queen Bess. It is not true, of course, that man has really bettered his condition by this discovery, for women, no longer able to distinguish between the false and the true by external appearance, now wants to see the price tag on the article. She has learnt the truth of the proverb "All is not brass what shines like a silver dollar." Money talks now as then.

Electroplating, nevertheless, is here to stay, and its range of

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effort is continually widening. It is interesting to note that those who found out the first things about electroplating profited little by their discovery. From their findings, however, there arose a demand for their practical application, and there was opened up an opportunity for piracy by men who pretended to have wonderful secrets. All industries start this way. When they grow large, 99 per cent of the secrets are printed in 25 cent books and the other 1 per cent is not even known that it is a secret, for it is really **so secret.** What was true of other industries was true in a peculiar way is true in the electroplating industry. Men who are sitting at these tables could fill a book with instances of laughable secret formulas and can tell tales of fabulous salaries and sums received for the possession of knowledge which is now the property of every electroplater who earns $15 a week. Times have changed and changed for the better. The surest sign of betterment in the world is the meeting together of men of one trade, as you are doing now. Don't make the same mistake as a body of men that individual men made before you. Don't imagine that you can keep things secret. It is well to have in mind giving preferential help to the members of the Society, for you have countless opportunities to do so. It is better to add to your strength by your reputation of being able and willing to impart information to the trade at large rather than to confine information to a very few people compared to the great mass of workers in the field. No society or association has a monopoly upon brains, energy, enthusiasm and aspiration. Somewhere in this country someone is working on electroplating problems who has not yet heard of this society and who does not yet know that he will be a factor in the electroplating field. Yet, ten years from now every plater may be taking advantage of his discovery. It is good for us always to remember that while associations are valuable in standardizing industrial work and conduct, many of the improvements, and generally those the most important, are made by outside workers, who subsequently may join the association but did not derive their inspiration in the first instance from the particular trade association itself. Let us cultivate, therefore, the spirit of expansion, rather than that of contraction.

It is my sincere regret that I cannot be with you in person to benefit by association with you, to absorb the thousands of amperes of good fellowship for which the Chicago Branch is justly noted, but I send these few lines as an evidence of good faith and interest, in the hope that you may find at least a momentary of freedom from dullness. I wish you all a peaceful Christmas and a prosperous New Year, and that your prosperity as a branch and as members of it may continue until, as a result of the Great Final Analysis, you may find the Solution of your Future to be composed of 100 per cent everlasting happiness and not something akin to liver of sulphur.

A FEW HINTS OF VALUE TO THE PLATER *

By Louis Schulte

The object of this paper is to give a few practical points in relation to the different solutions in use daily.

I will not waste any time to quote historical points or impromptu remarks, but simply come right down to business and start with the "King of the metals"—"GOLD."

In my practice I have found it more economical in saving time and material not to buy any chlorides nor cut down the gold with acid, but simply using the old reliable method of employing porous cup with any kind of cathode, using a strong current with a given amount of cyanide in the solution and weighing the gold anodes from time to time. In this way I could always make my gold solution while doing any other kind of work. I do, however, make it a practice of adding phosphate of sodium, little by little, from time to time, to the gold solution to produce a more rich yellow gold color. When the solution becomes exhausted of the metal, I add more cyanide and use the porous cup again and by this means I keep the gold solution working from morning until night for a very long time.

For the production of different shades in gold plating, green, red, etc., I use the same process of hanging silver or copper as anode in the solution, using the porous cups until the desired color is obtained. But in such solutions I would advise to use only a very little or no phosphate of sodium, as an excess of the latter prevents the production of antique gold colors. Any gold solution will, of course, become after a while partly saturated with other metals, as copper, iron and the like, from the metals to be plated; or other solutions, like brass or silver, which were used previous and in connection with gold plating. This is always the case when the gold solution works dull and smutty and it is then a waste of time and material to add more gold to such a solution to bring it back to the right color. Such a solution, of course, contains always enough gold to be recovered. I therefore store this solution in a large stone crock until I have sufficient accumulated, at which time I precipitate the gold with zinc-dust and cyphering, dissolving the other metals with hydrochloric acid and washing; leaving the pure metallic gold in a powder form as the residue at the bottom of the crock or on a filter paper.

The recovery of gold from cyanide solutions has been described in papers delivered before to this Society, but I differ in the method of using this gold powder, and as stated above, I do not dissolve this powder in nitric acid and hydrochloric acid, but simply fill it in a narrow tiny bag, in which I place a lead or platinum wire as a connector, and use this powder as gold anode again.

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*Read at Chicago Branch banquet, December 12, 1914.

The next metal or solution I would like to speak of is "SILVER."

What I have said in regard to the making and maintaining of a gold solution applies also to the making and maintaining of a silver solution that is absolutely reliable.

In making a new silver solution or by adding more silver to any old silver solution, I have in late years done entirely away with buying silver nitrate, silver chlorides or silver cyanide. Simply buying the pure fine silver anodes and using cyanide of potassium in connection with one or more porous cells. Weighing the anodes from time to time, and calculating the amount of silver deposited, I have no trouble in maintaining the amount of silver in the solution. I have made it a practice, especially when I use a solution low in metal (which has been worked with a low current), to hang one or two porous cells with a metallic connector inside, and, of course, filled with water and a little cyanide, continuous on the working rods.

By this procedure I dissolve from the anodes an equal amount of silver equal to that deposited on the goods, adding, of course, from time to time, cyanide of potassium.

Heavy concentrated silver solutions, say containing four ounces of silver, with at least a double amount of cyanide, will maintain the metallic contents even without the use of a porous cup. I might mention here that our Supreme President, Mr. Hogaboom, made a statement at our last convention that he used a silver solution for the period of eight years without adding any silver by means of chlorides or nitrates, etc.

The principal point that I want to bring out, is to make a statement that a silver solution supplied with cyanide of potassium and fine silver anodes is superior in working quality and is more economical to use. The life of such a solution will, in many cases, be double the length of that of a solution made from chloride of silver, for the simple reason that there is not much chance of the solution becoming thick or concentrated with chloride of potassium and carbonate of potassium. I would suggest to a plater having the opportunity of keeping several silver solutions continuously in work that he uses in the one solution cyanide of potassium exclusively and in the other cyanide of sodium exclusively, and my belief is that he will get more efficiency from the cyanide of potassium and the solution will last longer than the solution containing the cyanide of sodium, which has a tendency to crystallize, therefore, meaning additional cyanide to overcome this resistance or precipitation with barium.

I will not forget to mention that I have abandoned entirely the use of sulphorated carbon as a silver brightener, and use in place of this potassium permanganate, in connection with a little ammonia, which is not only a brightener but also a purifier of silver solutions, without fear of spoiling the solution, as this happens in using an excess of sulphorate of carbon.

I will also take the opportunity, or rather the liberty, to

state that the "Faraday Law" may be right in applying to laboratory use and scientific research work. But in front of the Humble Plater the "Law" does not apply to, and only irritates. For example:

A new silver solution containing one ounce of silver metal and one ounce of free cyanide per gallon, this could be called a standard solution and will deposit by a given voltage in a given time according to the amount of amperes, the weight in silver plating equal to "Faraday Law," but an old silver solution containing also one ounce of silver metal and naturally a large amount of chloride of potassium and carbonate of potassium will show by an equal voltage more amperes but deposits less silver. The same is true in other solutions, whether alkaline, neutral or acid, whether cold or warm, and whether less or more conductive or resistance salts are present.

The third metal or solution this paper deals with is "NICKEL."

About Nickel Solutions and Nickel Plating in general so much has been written and one hundred and one different kinds of formulae have been published and just as many failures are heard about every day. The writer is in doubt as to whether it will be possible to adopt a standard solution to answer all purposes, on account of the various classes of goods to be plated, whether flat or hollow articles, rough castings or highly polished work, and also on account of the various kinds of metals to be plated. Therefore, I would suggest, in order to determine whether a standard solution could be agreed upon, that the members of this Society get together and make practical tests in the following manner:

For instance: Have not less than twelve different kinds of nickel solutions tested at the same time, under the same conditions, with the same current, anode surface, and the same distance from the metals to be plated. An important feature is that only two bus bars be used, one for the anode and the other for the cathode. These two bus bars should be of sufficient length to be placed across the twelve glass containers, which should be of one size, either one gallon or two gallons.

The reason I advocate one anode rod and one cathode rod is because by two anodes the conductivity of the different solutions could not be controlled and compared. In other words, a solution which would also plate the rear side of a metal piece close to the wall of the containers where there is no anode, such a solution would easily plate in profiled or hollow articles, while the solution which does not plate on the reverse side of a metal piece could only be used for flat work, and this would be one point against this particular solution.

Another solution which would show black streaks or oxidizing on the reverse side of a metal piece would have two points against a standard form. The anodes should be all of rolled nickel sheet, of the same dimensions and properly balanced. In other words, every anode must weigh the same for the purpose

of controlling the different actions and solvents in the different solutions. Cast anodes can not be used for this experiment, as it is difficult to weigh cast anodes on account of the moisture of the solution which will enter the pores of the castings.

For the purpose of weighing and controlling the amount of nickel deposition from the various solutions, it is necessary to have for each solution three sheets of metal, preferably bright steel sheets, all of the same dimensions and weight. Each solution will have to be marked according to the alphabet and each metal piece to be tried has to be marked to correspond with the various solutions. For instance, "Solution A. Test 1." or "Solution L. Test 11."

Another important point I would suggest is that the members of the Society make this experiment under the supervision of an instructor chosen by the Society. The ingredients of the solutions should not be known by the members but a copy of the ingredients composing these solutions should be placed in the hands and care of the Secretary of our Society.

A solution which would withstand the most tests would then be published by the Secretary as the "standard solution." Should there also be a solution, for instance, that would satisfactorily stand twenty tests out of the twenty-four, but is a very complicated solution, containing quite a number of various chemicals that would be difficult to maintain, then the next solution withstanding satisfactorily eighteen or nineteen tests out of the twenty-four, composed of a very simple formulae, should be considered the standard one. To accomplish this number of tests it will be necessary to have the members meet together and work same out, say on a Saturday afternoon. Also one test should be made by leaving the goods in the solution, with a medium current, over night. The next day the experiments will have to be continued to investigate whether or not the various solutions that have been working throughout the night give the same results as on the previous day. Also the anodes and nickel deposits would have to be weighed.

It is also necessary to have equal pieces of highly polished articles to control the time by which the solution would maintain the bright color for any given length. Also various kinds of castings and stampings of various metals have to be plated for these various tests. To make it short, I would say that the deposition counted by weight should be tested all on flat sheets, by 1 volt, 3 volts and 5 volts, and for about fifteen minutes.

Of course, the failures of the other solutions should be made known to the members.

A nickel deposit which would not withstand the bending of these steel sheets without the nickel peeling off should not be allowed to compete, also a nickel deposit which turns black by 2½ volts on a flat sheet on account of burning should not be allowed to compete. Polished strips of zinc sheet and polished sheets of tin plates should also be plated in the various solutions, with various current densities. The nickel deposit must

have a white, dense, easy buffing deposit, free of streaks or pitting. The solution should preferably work independently on a high or low current.

All good samples from the various solutions should be kept in the care of a member, and placed in a room where sufficient air and moisture will attack them. After a length of time we could then witness that a certain nickel solution containing certain conductive salts, etc., will turn yellowish, others blueish, and others grayish, and others keeping a white bright finish for any length of time and showing at the same time more resistance against quick corrosion and rusting of the iron.

By this suggestion, in order to prevent any arguments, I will not mention any kind of formulae, as the arguments are sure to follow the experiments.

The use of one amperemeter is wanted, besides a voltmeter, to control the maximum current of the dynamo or battery. If the members want to test the resistance of the different solutions, then we will need one amperemeter for each solution. But the knowledge of the different resistance in solutions is useless if we do not discount the amount of metal deposited.

I do not have to mention that all pieces or articles to be plated during these experiments should be absolutely clean; possibly cleaned by the same method, nor do I have to stretch this suggestion in mentioning other details, as this suggestion is made to the members of the American Electro-platers' Society and not to Shoe Makers.

Let us prepare for this test, and then come together and get busy, and the results of this experiment should not be given to anyone and everyone, but to be used by we platers, scientifically, for the interest and benefit of the American trade.

VALUE OF VOLTMETER AND AMMETER IN THE PLATING ROOM *

By S. E. Heuenerfauth

The subject of voltmeters and ammeters in the plating room and their value should be thoroughly understood by every plater.

The voltmeter serves as an indicator to show the pressure or voltage, while the ammeter indicates the volume of current consumed. While it is very satisfactory to know this, still there are other things that can be accomplished with these instruments. With the voltmeter properly connected, the voltage across each tank can be obtained, which in the writer's opinion is very essential. Yet how many voltmeters are connected across the dynamo mains only, while the voltage across the baths is never known.

I will leave it to any plater whether the pressure across the tanks would not be of more value to him than to know the dynamo is generating 5 or 6 volts, the full voltage of which is

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seldom used in any plating solution, except for mechanical plating.

We are all familiar with the different voltage required for the different solutions. Then, why not make use of this valuable knowledge and work scientifically with the voltmeter instead of by thumb rule?

I have watched platers many times walk from one tank to another, raise some of the work out of the solution to see if it was plating right and not blistering or burning, and still the voltmeter was only used to read the dynamo voltage. I have had plater foreman tell me they could tell how much metal they had on the work by simply looking at it, without even knowing the pressure of the current going through the bath. I think this is absurd.

The ammeter is just as valuable as the voltmeter, as it indicates the volume of current passing through the solution at all times. If the number of square feet of work surface are known, then by the readings of the volt and ammeter you can determine instantly, if your solution is working properly, distance controlling. Again, if the same kind of work is put through the solution for any length of time and should the ammeter readings change from what they were at first, it indicates instantly that there is something wrong with the solution or with the resistance of the circuit.

These instruments can also be used to check up the different solutions at any time with very little trouble. Take a piece of sheet metal, say 12x12 inches, which would give 2 square feet of surface. Hang this in the solution, being careful that the distance from anodes to work surface is the same on both sides. Then adjust the voltage to anything desired and note the readings on both the voltmeter and ammeter. By making a careful record of the distance between the anodes and work surfaced, as well as the voltage and ampere readings, the same test can be applied after the solution has been worked for some time.

If the readings are not the same under the same conditions in making the test there is something lacking in the solution. In making these tests, I would further suggest making them in a smaller vessel of some kind, and bring this test solution up to the proper condition before adding any chemicals to the regular solution. Tests of this kind are not hard to make and require practically no expenditure for apparatus or material in addition to the volt and ammeter, and rheostat, with sufficient regulation and good contact.

By using these instruments constantly, you can turn out your work much easier and with less chance of burning or blistering the work; also with a better knowledge of the amount of metal you have deposited in a given time.

From an economical standpoint, it is not desirable to deposit too much metal on the work, but at the same time it is equally as necessary to get a sufficient amount of metal on the work at

all times. To obtain these results by any other method is by guess.

In the days of sharp competition, when every manufacturer is striving to bring each department up to the highest efficiency, why not aid in bringing your department up as well. If you do not have the necessary equipment, simply put the matter up to your employer in a business-like manner, telling him you can turn out your work in a more efficient manner at a saving in cost. I will venture to say you will not be long in obtaining the necessary equipment.

Remember this is the age of science; the demands of the world today are for facts. Business is now scientific. Ships do not set sail at the omen of the flight of birds. The gods have ceased to be angry with men, and men plead no more with the gods, nor with men. They work. They work understandingly.

S. E. HUENERFAUTH.

NICKEL PITTING AND SOME OF ITS CAUSES *

By Walter T. Donnelly

At the Chicago Convention of the A. E. S., held in June, 1914, your orator was asked by a brother member as to the cause and a remedy for the pitting of nickel deposits. Knowing full well that there is no one remedy or "cure-all" for pitting, I was restrained and cautious in my answers. The experienced plater hesitates to give the "cure-all" for any subject of problems in the plating room; more on account of his knowledge or lack of knowledge of conditions entering into such problems.

I also told this gentleman I would guarantee to stop in short order this trouble if it were mine. However, after telling him a few of its causes, I was impressed with the belief, more by his actions than what he said, that he thought I did not care to, or would not, give the desired information. No such thought, however, was in my mind. I was simply cautious about giving the wrong remedy, in which case I shuddered to think what would have been said of my remedy.

We know that pitting is caused by the adherence of hydrogen gas bubbles to the work being plated. Such bubbles being non-conductors, it follows that no electro chemical weld can occur in its immediate presence, especially underneath, where bubbles adhere. Work not having been rinsed thoroughly before entering the bath will, when current is turned on, exclude or throw out acid in pores, which also causes pitting.

Some fifteen years ago the writer had severe trouble with pitting, and after exhaustive experiments succeeded in conquering this trouble, so that after the above mentioned incident with my brother member, I again decided to go over the same ground, in order to satisfy myself. Accordingly, I filled a five gallon tank with nickel solution, taken from my work-a-day tank. I built solution up to test 6 degrees Beaume. (I might say here, I keep my solution as nearly 6½ degrees as possible.)

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I fitted with anodes, connected up, and a 2 volt pressure was used. After ten minutes work began to show signs of pitting. Proof No. 1: That a too concentrated solution is one cause of pitting. I then increased pressure to all it would stand without burning, and the pitting was very much increased and pronounced. Proof No. 2: That too much pressure, plus concentration of solution, also causes pitting. Bear in mind, I used new work with each test. I then made my solution fairly free in acid and work showed pitting to a marked degree. Proof No. 3: That excessive acids also had a tendency to cause pitting. Right here I wish to side-step a moment, to say that for the life of me I do not see how a nickel solution can become too acid under normal conditions. Of course, with abnormal conditions, such as improper rinsing of work before entering solution, I can see where acid condition can arise hastily and remain so for some time, but normal conditions prevailing, the sediment in solution, containing as it does considerable oxide of iron, would, in my opinion, take care of or absorb any reasonable excessive acid. The above leads me to say, if cleanliness is next to Godliness, then cleanliness in plating is absolutely essential in every way to successful plating.

My next test was excessive alkalinity, with all other conditions the same as for other tests, and whilst I found pitting, it was of a very minor character. My last, and as I think the most prolific cause of nickel pitting was as follows: I reduced my anode surface in the large tank to one-half or less of my cathode or work exposed, with regular pressure, and had as a result a very beautiful proof of pitting in less than ten minutes. I then shut off the current, replaced anodes, and run work for forty-five minutes. When removed the work was in good condition, which proved conclusively that insufficient anode surface, plus large cathode and stiff current pressure, is the greatest cause of nickel pitting.

I have known mechanics to keep on loading tanks with the same quantity of cathode used months before without any addition of new anodes. My fixed rule is to always keep a mental record of anode surface and gauge a batch of work accordingly, always leaving an excessive anode surface.

In conclusion, I will say, in regard to the single salt solution, I wish to go on record as failing to see any advantage in its use, except on cheap novelty work, where quality is lost inside of quantity. In fact, after exhaustive tests, I found it a very good solution to leave alone, especially when you care about the standing up quality of your output.

I heartily agree with Brother Hanlon, who at our last meeting of Chicago Branch said he believed in tempering justice with mercy, and in my belief we all could accomplish this by making our nickel solution as follows:

Double Nickel Salts	4 ozs.
Sulphate of Nickel	4 ozs.
Boracic Acid	1 to 2 ozs.

Sodium Chloride .....2 to 3 ozs.
Water .....1 gallon

The above has been my standard solution for years and, together with ample anode surface and all other points being equal, you will have between you and nickel plating that Damon and Pythias feeling so much desired on our part.

In summing up, I will give a few serviceable don'ts.

Don't place salts in bags and hang in solution on the theory your solution will take up all it needs and no more. I prefer to dissolve mine in hot water (not boiling), and I have that plater's presentment that that procedure leaves nothing to be desired for that essential chemical affinity so necessary.

Don't overload your solution with cathode.

Don't be too indifferent or lazy to take an hour or two to experiment along whatever lines your experiment and occasion may present.

Don't be timid about telling your employer about your experiments and what you hope to accomplish, and don't forget to thrash out such experiments at your Society meetings. Maybe someone can set you right, if by chance you have a failure. Your motto should be "One for all and all for one."

FINGER TIPS *

By H. E. Willmore

"'The time has come,' the Walrus said,
'To talk of many things:
Of shoes and ships and sealing-wax
And cabbages and kings.'"

Do you remember, you platers of today, the arrogant proprietor of the room of green scum tanks, foul smells, great troughs of running water spanned by scarred boards white with pumice, inundated floors and dripping walls, groaning jack-shafts, and sputtering dynamos? He was king and he could do no wrong. He accepted little or no advice, because he brooked no "interference"; certainly from no one who did not spend ten hours a day in a plating room. When necessity called for something new, he went about producing it much the same as an alchemist. When he succeeded, his success was great, for the chances were nine to one that he had achieved something which he could not reproduce. His crown was purple cabbage.

You platers of today are students. You are gathering an abundance of information concerning not only the plating solutions, but also along the broader chemical, electrical and mechanical lines. You are studying shop practices as remote from the plating room as the foundry and the rolling mill, because these practices effect your product. A large percentage of this information you are obtaining through the A. E. S., from technical magazines, and from books. You digest the articles which

* Read at Chicago Branch banquet, December 12, 1914.

you read and absorb those parts which immediately interest you. If you can remember the vital points of every article or book which you read, your mental wealth will grow prodigiously. The human brain, however, seems so built that the pictures which are impressed upon it gradually fade unless constantly retouched. Those things with which you are working every day you will remember perfectly, but the other things will fade away from you. It may be that you will find they have entirely disappeared at a very critical time. For example, few platers are called upon to redesign a plating room or to lay out a new room more than once or twice in their career, but this is often the time when the "big" man's eyes are upon you, and for this reason, as well as for your own pride and satisfaction, you want a highly efficient layout. If, when this time comes for you, you can remember all the things you have read or heard concerning drainage, ventilation, power computation, wire tables and the like, your design will undoubtedly be excellent. But these are the things which you will not remember, because you do not use this information every day.

The next best thing to remembering all you read, hear and see, is possibly to own all the books and technical papers published, and save them against the time when their information will prove valuable. There are several drawbacks to such a scheme. A mental index of such a library would be very inadequate, and reading through this library every time you wanted some part of the information contained in it would take more lives than you have to give to your profession. Moreover, some of the books and magazines may only contain a single article or even a paragraph which is of value to you.

If you cannot remember all you have studied or where to find what you have studied, obviously the next best thing to do is to develop a system for keeping tab on these things. Develop a filing system for clippings, notes, and titles of helpful and interesting articles. Every one will have his own system of filing, and I can only offer my idea of an adequate system. Have two kinds of files; one for letter size papers and one for index cards (4x5 inches). Divide these two files into similar sections and head these sections with some such titles as "Cleaning and dipping," "Chemical Analysis," "Brass," "Bronze," "Copper," "Gold," "Nickel," "Silver," "Tin," "Zinc," "Lacquers," "Machinery," "Shop Practice," and "Miscellaneous." File your clippings in their proper places under these headings in the larger file and your index cards in the card file. For Example, in the letter size file, under "Copper," place all clippings concerning copper plating, coloring and finishing, and all large sheets of notes which you may have gathered from meetings or from magazines and books, which you do not have or do not intend to keep. This larger size file you will soon find will contain an abundance of valuable material in such form that you can locate it in a very short time. If any of the divisions become crowded so that the time required to uncover an article becomes too great, sub-

divide the above headings. Thus the "Copper" section of your file may be divided into "Copper Solutions" and "Copper Coloring" or even smaller divisions.

Make your smaller file the book of "where to find things." Also place in it all notes which you care to put on cards. For every article of interest or of possible future benefit to you and which you do not care to clip for the larger file, write out a card and drop it into the proper section of your card file. Then when you are looking for a new or different shade of oxidized copper from the one which you are using, refer to your card index. Cards written for articles in magazines should give the title of the article, the author, the name of the magazine, the volume and page number, and any comment or synopsis which you may care to write. Cards for books should give the title, the author, the publisher, the date of the edition, and a synopsis or comment. Keep the divisions of your card file at all times the same as those of your larger file.

An appeal for a private file and a card index would have been ignored by the plater of days gone by. But you are fast becoming the engineers of all things pertaining to plating, and it is imperative that you devise some system of keeping a store of knowledge within arm's length, for it is the man who knows the art of enhancing his own knowledge with that of others who becomes known as the man with the information at his finger tips.

COMMENT AND CRITICISM

In the September issue of the Review, Milwaukee Branch reports a very interesting discussion on Nickel. As some of the questions asked are of such importance, involving Scientific explanations, I deemed it best to consult authorities of recognized ability. I wrote to the following gentlemen for their views: Mr. Chas. H. Proctor, Prof. Jos. W. Richards, Prof. Oliver P. Watts, Prof. C. W. Bennett, and Geo. B. Hogaboom, I give their replies:

"Regarding your letter inquiring why I recommend additional agents in the form of glue or molasses to several solutions, I can only state that in practice I have found such substances of value in producing denser, more homogeneous, and less crystaline deposits. The reason why has not been scientifically determined, although various attempts have been made by several authorities to do so. If I were at home (Mr. Proctor was then traveling in the west) I should be pleased to send you some papers presented before the American Electro-Chemical Society on "Organic additional agents to acid Copper Solutions," by Wing Ting Fu, a Chinese graduate of Columbia College; and on "Good Baths," by F. Matthers."

(Signed) C. H. PROCTOR.

Right here I wish to thank Mr. Krom of the "Metal Industry" for loaning me the papers in question, and from which I quote:

"It was thought that organic materials might give satisfactory addition agents. There is no mention in the literature so far as the author has been able to investigate concerning the use of addition substances. In one book, the name of the author of which has been forgotten, there is a statement that new wooden electroplating tanks produce an action upon the metal deposits. This indicates that wood contains some active addition substance which dissolves in the Electrolyte. Tarvocin, licorice and other water extracts of vegetable substances have been used in many instances. Ten grams of the yellow heart wood of Poplar was boiled for forty-two hours with 40cc of 50 per cent Acetic Acid (and I suppose added to the lead bath). The deposit was hard, firm and very free from crystals. Extracts of pine wood, linden wood, black oak wood and black walnut wood, glue and molasses have been added to the lead baths and an improvement was noted."

(Signed)
PROFS. F. C. MATTHERS and BARNETT W. COCHRAN
Indiana University.

"As Mr. G. B. Hogaboom knows more about these things than I, I have referred your letter to him.

(Signed) PROF. JOS. W. RICHARDS,
Leigh University.

"Dear Sir:—I will try to reply to the questions in your letter of the eighth in their order. Gum arabic and gelatine, or glue, the latter, especially, has been used in the solutions for the refining of lead and copper, for the purpose of securing a smoother deposit than is obtained without their use. I have not seen the accounts of the use of these substances in nickel baths. If you want to experiment with them I advise you to do so in only a small portion of your baths; start with very small additions, which may finally be carried up to one-eighth of an ounce to a gallon. Much of these materials spoil both the copper and lead deposits. I have just begun experimenting with the high-power salts now on the market. (I don't think the Review the proper place to "boost" a special brand of Rapid plating salts, and for that reason I will omit its name, but will be glad to give it to parties interested on a personal inquiry to me—Jos. Walters). So far as my experience goes, a deposit smooth enough to require little polishing is either very thin, or, if thick, has been produced by the addition of some special brightener to the baths—which renders the deposits hard and brittle as well as bright. A thick deposit of soft nickel will always be dull, but because of its softness may polish with less labor than a brighter deposit of harder metal. To prevent brittleness in the nickel deposit, avoid all acidity in the bath, even boric acid. Neutralize any acid by nickel carbonate, or even keep a slight excess of this in the bath all the time. The warmer the solution, the softer and less brittle will be the deposit. A hot neutral nickel solution gives a soft deposit, and permits of plating at from two to five times the rate for cold solutions, but the greater current requires

a large increase in the anode surface; else the solution becomes acid by use. Should you use any high-power nickel solution I would advise increasing the anode surface proportionately to the increase in current over your present practice. The above answers are based on considerable reading and a little experimenting in the laboratory, but no experience in practical plating. I hope many electroplaters will join the Electro-chemical Society and bring electroplating more to the front at the meeting of the Society than has been the case in the past. It is to me the most interesting branch of Electro-chemistry."

(Signed) O. P. WATTS,
University of Wisconsin.

(NOTE)—Will the Branch which asked for this information and receives such valuable replies give a vote of thanks to these gentlemen who aided me in and made it possible to present their views for our benefit.

"Now, in regard to your questions. First, I must explain my position. During the past year I have been closely associated with the industrial chemical laboratory in the plant where I am employed. The engineer and his assistants are college men of very high standing and consequently very broad minded. We have worked in harmony and have had a most pleasant time in studying the manipulation and, I may say, the "tribulations," of a plating solution. Our time this year has been given entirely to brass and copper, and nickel is reserved for next year. We have learned so many things that we did not know about brass and copper that I personally feel that I do not know anything about plating solutions. So little is written that is of real value that our work has been nearly all the result of individual and collective investigation. Even now we would not dare put our experience on paper, for we fear that we would be in error on the morrow, which so often has been the case.

At one time, and only a few months ago, I thought and really believed that I could write intelligently upon the workings of a plating solution; today I realize how crude my ideas were, and how misleading they would be to the readers.

In my opinion we must get down to the basic principles of a plating solution. First, we must know how much metal content is necessary and the amount of free acid or alkali to support that metal in solution and give the proper conductivity and reduction of the anode. If we read a formula now published we find that so much metallic salts should be added and so much chemicals of one kind or another. There is no definite knowledge given of the metal content or the exact ratio of the chemicals that are to be added. That is wrong and makes the plater work continually with an nuknown condition. There is no definite basis given to work upon, no foundation upon which to erect facts of a good working solution.

In the operation of a nickel solution this is more than true. Look at the number of solutions published and the patented

salts that are sold. Upon what is a plater to base his experiments? If a good working solution is wanted, which one is to be selected to begin with, or must he go through the entire list? The latter would hardly be possible, for a solution must be operated under commercial conditions for some months before the data of conductivity, deposit ratio, and the efficiency of the anode can be obtained.

You ask about gum arabic and transparent glue, and state that they are not electrolytes. Are you sure that they do not conduct electricity, and therefore, are not electrolytes? Their use is commonly understood to have them act as "controverters" of the ions, as all colloids would probably be that, it cannot follow that they actually do controvert the ions. They may be catalytic agents only. The brittleness of deposit is no doubt caused by the absorption of hydrogen, either in the deposit or by the metal being plated; in the latter case pitting and peeling would also result. This is due either to too much current density or too much free acid, which would bring about the same thing. The presence of too much free acid is difficult to determine. Which acid is it if both sulphuric and boracic are used, or, as in some cases, an organic acid is used also, for instance, citric acid? We have searched and failed to find an indicator that will show the end point in titrating for sulphuric acid in the presence of boric or any organic acid. The common indicators form nickel salts with the electrolyte used, or for the solution used for titration. So before we would be able to state what we think would be a good solution we must learn how much free acid is necessary for conductivity, reduction of anode and general efficiency without the evolution of hydrogen gas at the cathode. Brittleness of deposit can be caused by an excess of boracic acid. The structure of the deposit is quite different from that formed by an excess of sulphuric acid. In the latter case the deposit is hard, and while brittle has toughness, and can be made to 'cry' like tin. With the boracic acid deposit it will be found that the nickel plate will crumble in the hand if rubbed between the palms.

I would like very much to give you, and through you, the Society, the information you ask, but you can see from what I have written that I am in a peculiar position. Our study has made us ultra critical, yet we are unable to help ourselves. Many of my most cherished ideas have been blasted, and until we can get the knowledge we seek we are "up in the air" in regard to the best nickel solution or brightness.

We are, however, thirsty for knowledge, and what you are doing will be of great help to us, and we assure you that when we gain what we seek we shall tell you our experience in full."

Yours truly,

GEO. B. HOGABOOM.

Mr. Joseph Walters,
Richmond, Va.

Dear Sir:—

Your letter of November 8th has been received. In regard

to the addition of gelatine, gum arabic or glue to nickel baths, would say that the plater who claims the deposition of bright nickel from baths having such additions is correct. These substances are not completely insoluble, but will go into solution to a certain extent. The effect is due to the fact that these substances are colloidal, that is, they do not go into true solution, but go into colloidal suspension. These colloids have the property of going to the cathode, or negative pole of the machine along with the metal, tending to accumulate at the cathode or at the surface of the plate; these colloids tend to wet the surface of the depositing metal. This wetting of the surface tends to form a surface film over the particles of the metal. This surface film tends to hold the particles apart, and therefore, tends to prevent crystaiiization, or tends to form smaller crystals. Smaller crystals, of course, give a more finely textured deposit. A more finely textured deposit tends to reflect more light than does a coarser grained one. The fact of reflecting more light gives a brighter surface, so that here you have the causal connection between the addition substances and the bright deposit occasioned by a decrease in the crystal size.

Trusting that this explanation will be satisfactory, I am,

Very truly yours,

C. W. BENNETT,

Prof. Dept. of Chemistry, Cornell University.

The answer to the question, "What makes a nickel solution cloudy after being worked hard all day," is certainly novel—unique, one might say. The answer was, "Constant agitation by putting in and taking out work." I had a boy agitate one of my tanks for seven solid hours by immersing a number of pieces of castings—continually for seven hours. When one got tired (of "Love's Labor Lost") another boy took his place. I could see no change in the appearance of the solution in turpidity or cloudiness. The cloudiness appeared when current was applied and at the end of considerable time for plating, proving that the cloudiness was due not to the agitation of putting and taking out the work, but to the current and to the decomposition of substances during electrolysis.

In a neutral or even in a slight acid nickel ammonium sulphate solution during electrolysis the nickel is liberated from the nickel sulphate and deposited on the cathodes, and the acid again combines with the nickel from the anodes. This operation continues during plating, but when plating is done for some time, especially when a strong current has been used, it becomes alkaline, because less of ammonium sulphate is decomposed than nickel sulphate and the uncombined (if I may use this expression) ammonium sulphate is seen in a "hard day's worked" solution. A few drops of sulphuric acid will clear it; or, if given time, will clear itself.

JOSEPH WALTERS.

WHAT THE BRANCHES ARE DOING

NOTE TO THE SECRETARIES—All correspondence for this department must be in the hands of the editor by the 15th of each month.

SUPREME SOCIETY

Meets first week in June, 1915, at Dayton, Ohio. Secretary, Walter Fraine, 507 Grand Avenue, Dayton, Ohio.

NEW YORK

Meets fourth Friday of each month at Broadway Central Hotel, New York City, 8 P. M. Secretary, Joseph Minges, 148 Schenck Avenue, Brooklyn, N. Y.

The regular monthly meeting was held Friday, November 27th, with President Haddow in the chair. The date of February 20th has been secured at the Broadway Central Hotel for the annual banquet.

The spotting out problem was aired again, but no new light thrown on the subject. Mr. Thomas Brown has promised to give his views on the subject in a paper which he will present at some future meeting.

We are unable, as yet, to find a permanent meeting place fulfilling our requirements, but hope to do so in the near future.

ST. LOUIS

Meets fourth Saturday of each month at Public Library Assembly Rooms. Secretary, H. H. Williams, 2134 Nebraska Avenue, St. Louis, Mo.

An important item of business at our November meeting was the appointment of the committee to complete arrangements for our annual banquet, which will be held on Saturday, January 23rd, at the American Annex. The committee consists of F. Rushton, C. S. Weygandt, G. Samkemeyer, P. Tressider and H. Deubelbeis. We invite the Supreme officers to be with us, and it will be worth while of any member of other Branches who are expecitng to visit St. Louis to make an effort to come at this time. Plates will be reserved and progams sent by notifying the secretary.

The class in chemistry is progressing; it is proving a great opportunity to those desiring to become more proficient. Prof. Fisher and the Board of Education have our appreciation.

Our meeting this month will be held on the 17th on account of the holidays. We wish our Society and all Branches and members A Prosperous New Year.

TORONTO

Meets fourth Thursday of each month at Occidental Hall, Bathurst and Queen Streets. Secretary, Ernest Coles, P. O. Box 5, Coleman, Ont.

The regular meeting was held in Occident Hall on Thursday, November 26th. President Magill was in the chair. A good

attendance and some interesting talks among the members made up a very successful meeting.

A Tungsten lamp, which was somewhat of a freak, was exhibited by one of the members. The lamp had seemingly become coated on the inside with a very bright film of copper, and as it had been hanging in the plating room, it was of particular interest to the members. After some wierd and varied guesses, talks of fumes, etc., the matter was explained by Mr. W. J. Wilson, of the Toronto Technical School, an honorary member, that most likely a small amount of copper had been in or on the filament, and that the great heat of the incandescense had caused it to vaporize and it had then become deposited on the glass.

BRIDGEPORT

Meets third Friday of each month at the office of the Brass World, 260 John Street, Bridgeport, Conn. Secretary, Nelson Barnard, 858 Howard Ave., Bridgeport, Conn.

The November meeting was held on the 18th. After our regular routine work, the subject of plating galvanized steel in large quantities was taken up and a very lively discussion had on the subject. After hearing the different ways of preparing the work for the galvanizing process, also for the deposition of copper, brass and nickel, it was decided to give out as the best way to handle this kind of work was to use the following method: Have work tumbled, rinse and pass through nitric acid, rinse and pass through a 10 per cent solution of muriatic acid and water, rinse and then bring into galvanizing solution. After the galvanizing has been accomplished, rinse and put work into a tumbling barrel and tumble bright. If this is not done the deposit will peel off to the steel in trying to put on any other plate. We also had a talk on copper and zinc cyanide by Mr. Carl Ditmar. At our next meeting we will have demonstration in brass plating. Also are going to have a Dutch supper and smoker.

CHICAGO

Meets fourth Saturday of each month, 8 P. M., Western Building, Randolph Street and Michigan Avenue. Secretary, H. E. Willmore, 5911 South Boulevard, Chicago, Ill.

The regular monthly meeting was held November 28th, with President O. E. Servis in the chair and a large attendance. A paper by E. S. Thompson, entitled "BOUNDERS," was read by the secretary and was discussed at length. A discussion on standardization was engaged in by several members, the opinion being general that it is not feasible to standardize a nickel solution that would answer all purposes. The standardizing of experimental methods, as submitted by Bridgeport Branch, was commented on and are explained more fully in a paper by Mr. Louis Schulte, read at the annual banquet. The following questions were asked and are submitted to the membership at large

for discussion. What is the best way to test lacquers for durability? What is the proper metallic content of a nickel solution?

The third annual banquet of Chicago Branch was a grand success, and our only regret is that all the members of the A. E. S. could not be present.

DETROIT

Meets first Friday of each month at Prismatic Hall, 140 1st Street. Secretary, B. E. Miller, 545 Townsend Avenue, Detroit, Mich.

Our regular monthly meeting of December 4th was called to order, with President J. Schultz in the chair, and a good attendance. For the good and welfare of the Society, two papers were read, one by E. J. Lovering, entitled, "The Platers' Boomerang." The other, "After Which, What? The Boomerang."

Mr. Sequin, of the Detroit Stove Works, favored us with a few remarks on the pitting of nickel on stove castings and how he has succeeded in overcoming this diseased condition of nickel plating.

A banquet will be held some time in January.

CLEVELAND

Meets second and last Saturday of each month at Central Y. M. C. A. Secretary, Charles Werft, 331 Strathmore Avenue, Cleveland, Ohio.

A meeting of the Platers of Cleveland and vicinity was held at the Y. M. C. A., Saturday, November 21st, 1914.

Meeting was called to order by Mr. Richard H. Sliter, with a few remarks on the benefits to be derived from membership in the Society.

Mr. Wm. D. Scott was appointed Chairman pro tem. Mr. Charles Werft, Secretary pro tem. Mr. H. J. Ter Doest addressed the meeting on the benefits he had accomplished in calling the platers together for the evening. The enthusiasm and interest was of the very highest. Every plater that was present, who was eligible for membership in the Society, made application.

Secretary Werft was authorized to make application to the Supreme Society for a temporary charter. It was decided to hold the next meeting on December 5th, at the Central Y. M. C. A., at which time the election of officers will be held. Papers will be read on nickel plating, and discussions will follow.

The following made application for membership in the Society: E. W. Hale, Daniel Wren, Tehern Wadsworth, William T. Wicks, F. C. Heckel, William D. Scott, James Purcell. The following made application for transfer from New York Branch: Richard H. Sliter, J. E. Pflueger, Peter Henderman, J. J. Legge, H. W. Carter, J. W. Dallas, L. C. Bogner, C. Huberty, H. J. Ter Doest. Mr. A. D. Sopher will be transferred from Rochester Branch.

At the meeting held December 5th, Mr. Ter Doest presented a paper on "Observations on Nickel Plating." The discussions

that followed were very lively and interesting, especially on the pitting of nickel plating, the cause and remedy. It was the concensus of opinion that the addition of single nickel salts and a too acid solution was the cause, also too high a voltage. Three new applications were received as follows: Henry Ochs, Patrick Fitzgerald, Frank J. Burkland.

NEWARK

Newark, N. J. Secretary, Chas. A. Stiehle, 46 West Madison Avenue, Irvington, N. J.

At the meeting held December 4th, forty members were present, ten of them being members of New York Branch. President Horace H. Smith called attention to the equipment that had been installed. We now have a full complement of storage batteries, voltmeters, ampere meters, tanks, kettles, gas retorts, balance and chemical apparatus. Members are entitled to make use of all or any part of the equipment at any time, except on regular meeting nights.

The Whist committee reported that all arrangements had been made to hold Whist at Oraton Hall, Friday, January 15th. Banquet committee will hold meeting with committee from the New York Branch on this evening.

The Librarian reported that arrangements are being made for lectures each meeting night. Subjects will be presented as follows.

Copper, acid and alkaline solutions, zinc, bronze, brass, nickel and gold solutions, the use of conducting salts, what are the best conducting salts, and how their efficiency can be determined. All members were requested to come prepared to take part in the discussions that will follow each lecture, also to bring note books and pencils.

Mr. Charles Piske, chemist for Tiffany & Co., Forrest Hill, a member of Newark Branch, gave a lecture on how to determine the metal content of a cyanide silver solution. Each step was fully explained, and the solution used was furnished by one of the members, taken from his working solution just betore coming to the meeting. Result by determination—Burrette reading 22.7 cc. = .227 gms. of silver. 1 decigram corresponding to 1 troy ounce. Thus—.227 decigrams = 2.27 ozs. of silver to 1 gal. of solution. The solution was also tested for content of free cyanide and resulted in 1.5 ozs. free cyanide to each gallon of solution.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Penna., 34th and Spruce Streets, Philadelphia, Pa. Secretary, Philip Uhl, 2432 North Twenty-ninth Street, Philadelphia, Pa.

The regular monthly meeting of this Branch was held December 4th, with a good attendance. Dr. Lukens gave a demonstra-

tion in analyzing samples of nickel salts. A committee was appointed to arrange for an open meeting to be held, at Dooner's Hotel, January 15th, in place of the regular meeting.

BUFFALO

Meets first Saturday of each month at the University of Buffalo, 8 P. M. Secretary, John G. Murphy, 71 Dingens Street, Buffalo, N. Y.

Our last meeting was a good one, and as usual, well attended. Prof. Childs gave us an interesting and instructive talk on standardization.

We had one more join the class in chemistry at the school as a result of the review of the work we are doing, which we give at every meeting.

CINCINNATI

Meets once each month at Dennison Hotel, Cincinnati, Ohio. Secretary, F. H. Nordman, 720 Froom Ave., Cincinnati, Ohio.

ROCHESTER

Meets second and fourth Friday of each month at University of Rochester. Secretary, C. V. Haring, 603 Dewey Avenue, Rochester, N. Y.

DAYTON

Meets first and third Wednesday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, Alphonz Lamoureux, 500 East First Street, Dayton, Ohio.

MILWAUKEE

Meets first Friday of each month at Eagles Hall, 137 Second St.. Secretary, E. C. Yaeger, 962 Ninth St., Milwaukee, Wis.

ELECTED TO MEMBERSHIP

NEWARK—
George S. Thompson.....44 E. Kinney St., Newark, N. J.
PHILADELPHIA—
Robert C. Ledig.....3611 N. Smedley St. Philadelphia, Pa.

APPLICATIONS FOR MEMBERSHIP

PHILADELPHIA—
David A. Metz.....440 S. 57th St., Philadelphia, Pa.
CHICAGO—
Sam. Berman.....905 Sacramento Blvd., Chicago, Ill.
CLEVELAND—
E. W. Hale.....47 W. Market St., Akron, Ohio
Daniel Wren.....1383 E. 90th St., Cleveland, Ohio
Tehern Wadsworth.....Gray Appartments, Elyria, Ohio
William T. Wicks.....1303 Oregon St., Cleveland, Ohio
F. C. Heckel.....7511 Lawn Ave., Cleveland, Ohio
William D. Scott.....3707 Fulton Road, Cleveland, Ohio
James Purcell.....2171 Japan Ave., Cleveland, Ohio
Harry Ochs.....1837 W. 47th St., Cleveland, Ohio
Patrick Fitzgerald.....3915 Spokane St., Cleveland, Ohio
Frank J. Burkland.....2534 E. 30th St., Cleveland, Ohio

CHANGE OF ADDRESS

Joseph Emmett.....711 Niles St., Laport, Ind.
A. A. Nelson.....934 Washington Ave., Mishawaka, Ind.
E. S. Thompson.....4218 Carnegie Ave., Cleveland, Ohio